5-5 Use Inequalities in a Triangle

Definition of Inequality-- a > b iff there is a positive number c, such that a = b + c

$7 = 3+4$

$7 > 3$

Properties

Transitive

Addition/Subtraction

Multiplication/Division

Subst.

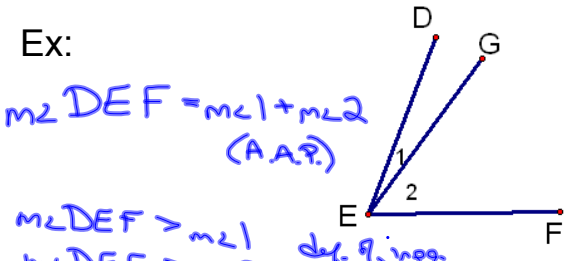
Ex:

$LN = LM + MN$ S.A.P.

$LN > LM$

$LN > MN$ def. of ineq.

Ex:

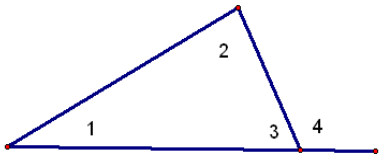


$m\angle DEF = m\angle 1 + m\angle 2$ (A.A.P.)

$m\angle DEF > m\angle 1$

$m\angle DEF > m\angle 2$ def. of ineq.

Ex:



$m\angle 4 = m\angle 1 + m\angle 2$ Ext ∠ thm

$m\angle 4 > m\angle 1$

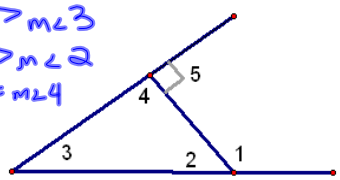
$m\angle 4 > m\angle 2$

Exterior Angle Inequality Theorem-The exterior angle of a triangle is greater than either of its corresponding remote interior angles

Which angle is the largest?

(Figure is not drawn to scale.)

∠1



$m\angle 5 > m\angle 3$

$m\angle 5 > m\angle 2$

$m\angle 5 = m\angle 4$

$m\angle 1 > m\angle 3$

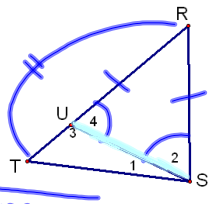
$m\angle 1 > m\angle 4$

Given: △RST

RU = RS

RT > RS

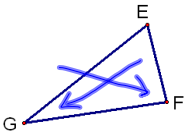
Prove: m∠RST > m∠T



S	R
①	① Given
② ∠4 ≅ ∠2	② B.A.T
③ m∠4 = m∠2	③ def of ≅
④ m∠4 > m∠1 m∠4 > m∠T	④ Ext ∠ Inequ thm
⑤ m∠RST = m∠1 + m∠2	⑤ A.A.P
⑥ m∠2 > m∠T	⑥ Subst.
⑦ m∠RST > m∠2	⑦ def of ineq
⑧ m∠RST > m∠T	⑧ trans. thm

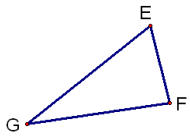
Theorem 5.10--If one side of a triangle is longer than another side, then the angle opposite the longer side is larger than the angle opposite the shorter side.

G: GE > EF
C: m∠F > m∠G



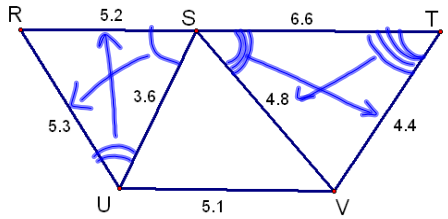
Theorem 5.11--If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than theside opposite the smaller angle.

G: m∠F > m∠G
C: GE > EF



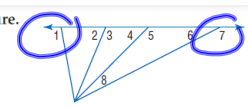
1. Which is greater, m∠RSU or m∠SUR?

2. Which is greater, m∠TSV or m∠STV?

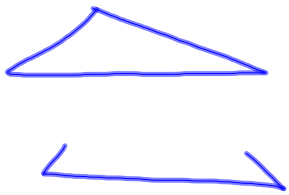


Determine which angle has the greatest measure.

17. ∠1, ∠2, ∠4
18. ∠3, ∠4, ∠6
19. ∠3, ∠5, ∠7
20. ∠1, ∠2, ∠6
21. ∠5, ∠7, ∠8
22. ∠2, ∠6, ∠8



Pasta Challenge

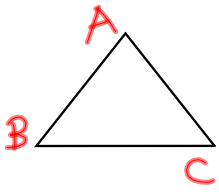


Thm. 5.12--The triangle inequality theorem--the sum of the lengths of any 2 sides of a triangle is greater than the length of the 3rd side.

$AB + BC > AC$

$BC + AC > AB$

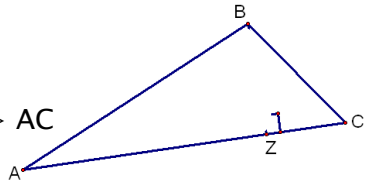
$AB + AC > BC$



Let's Prove it.

Given: ΔABC

Prove: $AB + BC > AC$



Do the lengths represent a triangle?

4, 5, 7 yes $4+5>7$ ✓

13, 12, 20 yes

7, 14, 21 no $7+14=21$

7, 7, 7 yes

8, 8, 19 no

Two sides of a triangle are 6 and 11.
What is the range of the 3rd side?

$5 < x < 17$

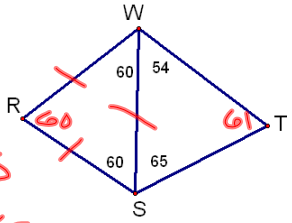
$11 - 6 = 5$ $\quad$ $11 + 6 = 17$

Two sides of a triangle are 12 and 18.
What is the range of the 3rd side?

$6 < x < 30$

What is the longest segment?

WT



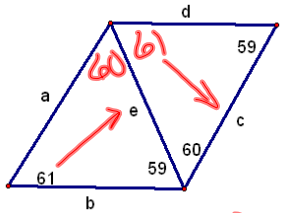
△WRS

△WTS

WT

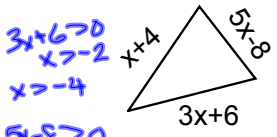
What is the longest segment?

C



$e > b > a$ $\quad$ $C > d > e$

Describe the possible values for x.



$3x+6>0$, $x>-2$, $x>-4$

$5x-8>0$, $x>\frac{8}{5}$

$\frac{10}{3}<x<18$

$5x-8+3x+6>x+4$

$8x-2>x+4$

$7x>6$

$x>\frac{6}{7}$

$x+4+5x-8>3x+6$

$x>\frac{10}{3}$

$x+4+3x+6>5x-8$ $x<18$

HW p331-332
#s 6, 10-13, 16-19, 21-23, 30, 31, 33, 34